MODEL: TT4761B01-3

Ver.0.1

Date:08.May.2013

Customer's Approval		CSOT	
Signature	Date	Approved By Product Director Name: Richard Lung Signature:	Date
		Reviewed By PM Manager Name: Aaron Tu Signature:	Date
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Contents

Revision History

Version	Date	Page (New)	Section	Description	Revision by
Ver. 0.1	08.May.2013	26	9	Tentative Specification was First Issued.	ZouYingnan

1. General Description

1.1 Product Features

- **FHD Resolution (1920 x 1080)**
- **Very High Contrast Ratio:4000:1**
- **Fast Response Time**
- **Ultra Wide Viewing Angle: 178° (H)/178° (V)(CR≥10)**
- **DE (Data Enable) Mode**
- **LVDS (Low Voltage Differential Signaling) Interface**

1.2 Overview

TT4761B01-3 is a diagonal47.6”color active matrix LCD open cell with 2ch-LVDS interface. This open cell is atransmissive type display operating in the normally black mode. It supports 1920x1080 FHD resolutions and can display up to16.7M colors (8bit). Each pixel is divided into Red, Green and Blue sub-pixels which are arranged in vertical stripe.

This open celldedicates for LCD TV products and provides excellent performance which includes high transparency, ultra wide viewing angleand high color depth. CSOT open cell comply with RoHS for identification.

1.3 General Information

<table>
<tr><th>Item</th><th>Specification</th><th>Unit</th><th>Note</th></tr>
<tr><td>Active Area</td><td>1054.08(H)x592.92(V)</td><td>mm</td><td></td></tr>
<tr><td>Cell Size</td><td>1068.750(H) x 607.610 (V) x 1.350 (D)</td><td>mm</td><td></td></tr>
<tr><td>Weight</td><td>2.0</td><td>kg</td><td>Max.</td></tr>
<tr><td>Driving Scheme</td><td>a-Si TFT Active Matrix</td><td>-</td><td></td></tr>
<tr><td>Number of Pixels</td><td>1920x1080</td><td>pixel</td><td></td></tr>
<tr><td>Pixel Pitch (Sub Pixel)</td><td>0.183 (H) x 0.549 (V)</td><td>mm</td><td></td></tr>
<tr><td>Pixel Arrangement</td><td>RGB Vertical Stripe</td><td>-</td><td></td></tr>
<tr><td>Display Colors</td><td>16.7 M</td><td>color</td><td>8bit</td></tr>
<tr><td>Display Mode</td><td>Transmissive Mode, Normally Black</td><td>-</td><td></td></tr>
<tr><td>Glass Thickness (Array/CF)</td><td>0.5/0.5</td><td>mm</td><td></td></tr>
<tr><td>Color Chromaticity</td><td>R=(0.633,0.334)
G=(0.322,0.631)
B=(0.159,0.049)
W=(0.280,0.290)</td><td></td><td rowspan="4">Typical value measured at CSOT’s module: MT4761B01-1</td></tr>
<tr><td>Contrast Ratio</td><td>4000:1(Typ.)</td><td></td></tr>
<tr><td>Cell Transmittance</td><td>5.6 % (Typ.)</td><td>%</td></tr>
<tr><td>View Angle(CR>10)</td><td>+89/-89(H),+89/-89(V) (Typ.)</td><td></td></tr>
<tr><td>Polarizer(CF side)</td><td>Anti-glare, Haze2%, Hard Coating(3H)</td><td></td><td></td></tr>
<tr><td>Polarizer(TFT side)</td><td>Hard Coating(3H)</td><td></td><td></td></tr>
</table>

2. Absolute Maximum Ratings

2.1 Absolute Maximum Ratings (T_A= 25 ± 2 °C)

The followings are maximum values which, if exceeded, may cause damage to the unit.

Item	Symbol	Value		Unit
		Min.	Max.	
Power Supply Voltage	V_{CC}	-0.3	13.8	V
Input Signal Voltage	V_{IN}	-0.3	4.0	V

2.2 Environment Requirement (Based on CSOT Module MT4761B01-1)

(1) Temperature and relative humidity range are shown as below.

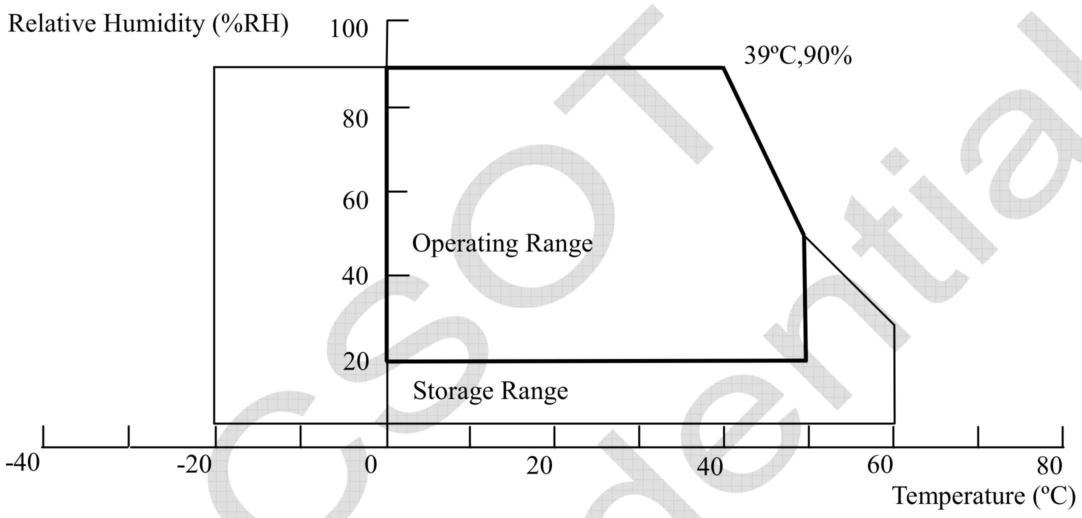

Fig. 2.1Operating and storage environment

(a) 90%RH maximum (T_A≤39 ºC).

(b) Wet-bulb temperature should be 39ºCmaximum (T_A>39 ºC).

(c) No condensation.

(2) The storage temperature is between - 20 ºC to 60 ºC, and the operating ambient temperature is between 0 ºC to 50 ºC.The maximum operating temperature is based on the testcondition that the surface temperature of display area is less than or equalto 65ºC with LCD module in a temperature controlled chamber alone. Thermalmanagement should be considered in final product design to prevent the surface temperature of display area from being over 65ºC. The range of operating temperature may degrade in case of improper thermal management in the end product design.

(3) The rating of environment is based on LCD module. Leave LCD cell alone, this environment conditioncan't be guaranteed. Except LCD cell, the customer has to consider the ability of other parts of LCD module and LCD module process.

2.3 Absolute Ratings of Environment (Open Cell)

When storing open cell as spares for a long time, please follow the precaution instructions:

(1) Do not store the module in high temperature and high humidity for a long time. It is highly recommended to store the module with temperature from20ºC to 30ºCin normal humidity (50±10%RH) with shipping package.

(2) The open cell should be keep within one month shelf life

3. Electrical Specification

3.1 Open Cell Power Consumption (TA = 25 ± 2 °C)

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		V_{CC}	10.8	12.0	13.2	V	(1)
Rush Current		I_{RUSH}	-	-	2.0	A	(2)
Power Supply Current	White Pattern	I_{CC}	-	0.38	0.49	A	(3)
	Horizontal Stripe	I_{CC}	-	0.78	1.01	A	
	Black Pattern	I_{CC}	-	0.34	0.44	A	

Note:

(1)The ripple voltage should be controlled less than10% of V_{CC}.

(2)Measurement condition: V_{CC}=12V, rising time=470μs.

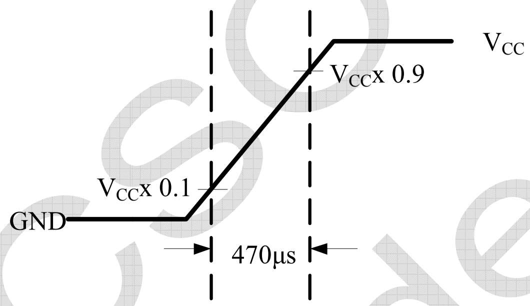

Fig. 3.1 V_{CC} rising time condition

(3)Measurement condition: V_{CC}=12V, Ta = 25 ± 2ºC, F = 60 Hz. The test patterns are shown as below.

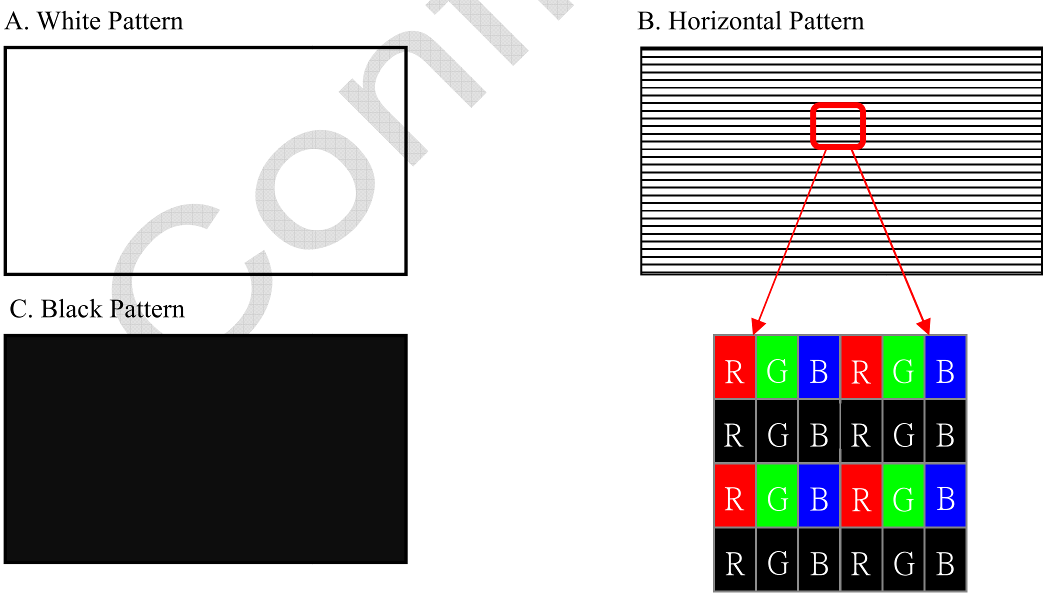

Fig. 3.2 Test patterns

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3.2 LVDS Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
LVDS Interface	Differential Input High Threshold Voltage	V_{TH}	+100	-	-	mV	(1)
	Differential Input Low Threshold Voltage	V_{TL}	-	-	-100	mV	
	Common Input Voltage	V_{CM}	1.0	1.2	1.4	V	
	Differential Input Voltage	$\|V_{ID}\|$	200	400	600	mV	
	Terminating Resistor	R_T	87.5	100	112.5	ohm	
CMOS Interface	Input High Threshold Voltage	V_{IH}	2.7	-	3.3	V	
	Input Low Threshold Voltage	V_{IL}	0	-	0.7	V	

Note:

(1) The LVDS input signal has been defined as follows:

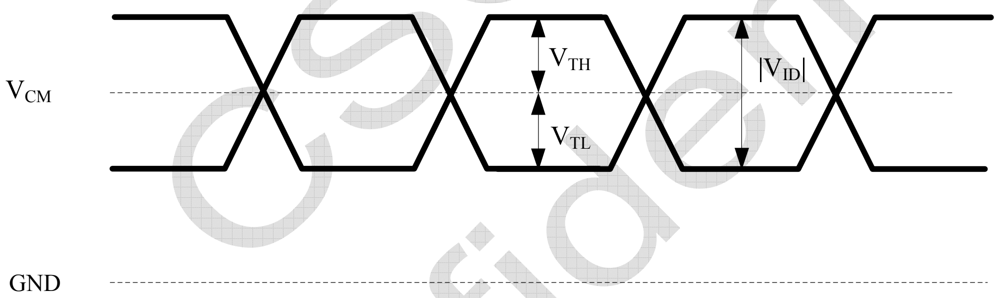


Fig. 3.3 LVDS input signal

4. Input Terminal Pin Assignment

4.1 Interface Pin Assignment

CN1: CT000041-513C (FCN) or equivalent (see Note (1))

Pin No.	Symbol	Description	Note
1	N.C	No Connection	(1)
2	SCL	I2C Serial Clock (for adjust VCOM)	(2)
3	SDA	I2C Serial Data (for adjust VCOM)	
4	N.C	No Connection	(1)
5	L/R_O	Output Signal for Left Right Glasses Control (High: Left Glass turn on Low: Right glass turn on)	
6	N.C.	No Connection	
7	SELLVDS	Input Signal for LVDS Data Format Selection (High:VESA Format, Low or Open JEIDA Format)	(3)
8	N.C.	No Connection	(1)
9	N.C.	No Connection	(1)
10	N.C.	No Connection	(1)
11	GND	Ground	
12	ORX0-	Odd Pixel Negative LVDS Differential Data Input. Channel 0	
13	ORX0+	Odd Pixel Positive LVDS Differential Data Input. Channel 0	
14	ORX1-	Odd Pixel Negative LVDS Differential Data Input. Channel 1	
15	ORX1+	Odd Pixel Positive LVDS Differential Data Input. Channel 1	
16	ORX2-	Odd Pixel Negative LVDS Differential Data Input. Channel 2	
17	ORX2+	Odd Pixel Positive LVDS Differential Data Input. Channel 2	
18	GND	Ground	
19	OCLK-	Odd Pixel Negative LVDS Differential Clock Input	
20	OCLK+	Odd Pixel Positive LVDS Differential Clock Input	
21	GND	Ground	
22	ORX3-	Odd Pixel Negative LVDS Differential Data Input. Channel 3	
23	ORX3+	Odd Pixel Positive LVDS Differential Data Input. Channel 3	
24	N.C.	No Connection	(1)
25	N.C.	No Connection	(1)
26	2D/3D	Input Signal for 2D/3D Mode Selection (High:3D Enable,LOW:3D Disable)	
27	N.C.	No Connection	(1)
28	ERX0-	Even Pixel Negative LVDS Differential Data Input. Channel 0	
29	ERX0+	Even pixel Positive LVDS Differential Data Input. Channel 0	
30	ERX1-	Even Pixel Negative LVDS Differential Data Input. Channel 1	

31	ERX1+	Even Pixel Positive LVDS Differential Data Input. Channel 1	
32	ERX2-	Even Pixel Negative LVDS Differential Data Input. Channel 2	
33	ERX2+	Even Pixel Positive LVDS Differential Data Input. Channel 2	
34	GND	Ground	
35	ECLK-	Even Pixel Negative LVDS Differential Clock Input	
36	ECLK+	Even Pixel Negative LVDS Differential Clock Input	
37	GND	Ground	
38	ERX3-	Even Pixel Negative LVDS Differential Data Input. Channel 3	
39	ERX3+	Even Pixel Positive LVDS Differential Data Input. Channel 3	
40	N.C.	No Connection	
41	N.C.	No Connection	
42	N.C.	No Connection	(1)
43	N.C.	No Connection	(1)
44	GND	Ground	
45	GND	Ground	
46	GND	Ground	
47	N.C.	No Connection	(1)
48	VCC	+12V Power Supply	
49	VCC	+12V Power Supply	
50	VCC	+12V Power Supply	
51	VCC	+12V Power Supply	

Note:

(1) For CSOT internal only, please let it opens.

(2) 3D Format: Default line by line.

(3) High: connect to +3.3V→VESA Format; Low: connect to GND or Open→JEIDA format.

(4) The first LVDS data is ODD LVDS data

(5) The direction of pin assignment is shown as below:

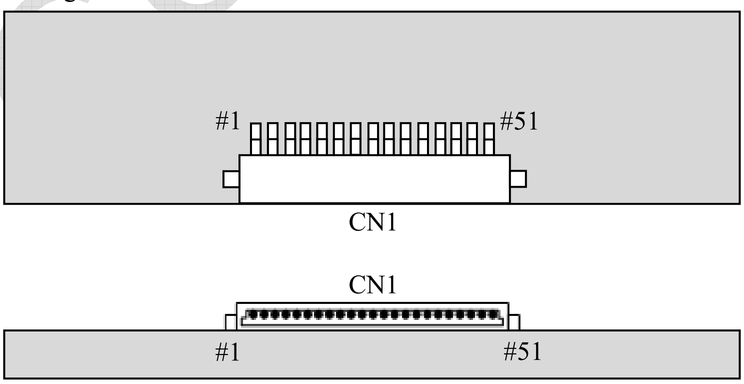


Fig. 4.1 LVDS connector direction sketch map

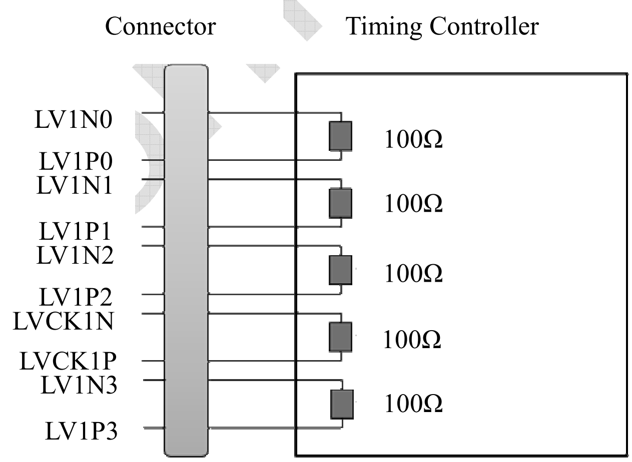
CN1: 0-12002024-5 (XINDAYITONG) or equivalent

Control board				Converter		
Pin NO.	Symbol	Feature		Pin NO.	Symbol	Feature
12	NC			1	NC	
11	NC			2	NC	
10	PDIM	PWM dimming	3	3	NC	NC
9	SI	SLI Write		4	NC	NC
8	SO	SLI Read		5	NC	NC
7	SC	SLI CLOCK		6	NC	NC
6	GND	GND	FFC	7	GND	GND
5	GSCLK	GSCLK		8	NC	NC
4	PG	PG		9	PG	PG
3	FLT	Normal :high		10	NC	NC
		Abnormal: low				NC
2	2D/3D	ON/OFF,Low:2D,High,3D		11	2D/3D	ON/OFF,Low:2D,High,3D
1	VSYNC	VSYNC		12	VSYNC	VSYNC

Note:

If the customer's converter without the use of SLI, PG pin must be pull high(high=3.3V), PG timing is synchronization with the backlight enable signal.

4.2 Block Diagram of Interface



Attention:

(1) This open cell uses a 100 ohms (Ω) resistor between positive and negative lines of each receiver input.

(2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line respectively.

4.3 LVDS Interface

4.3.1 VESA Format (SELLVDS = H)

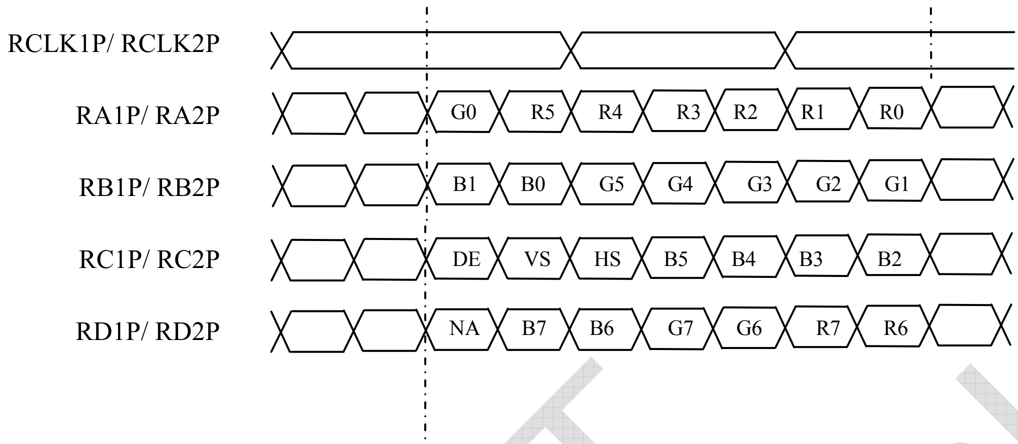


Fig. 4.2VESAformat

4.3.2 JEIDA Format (SELLVDS = L or Open)

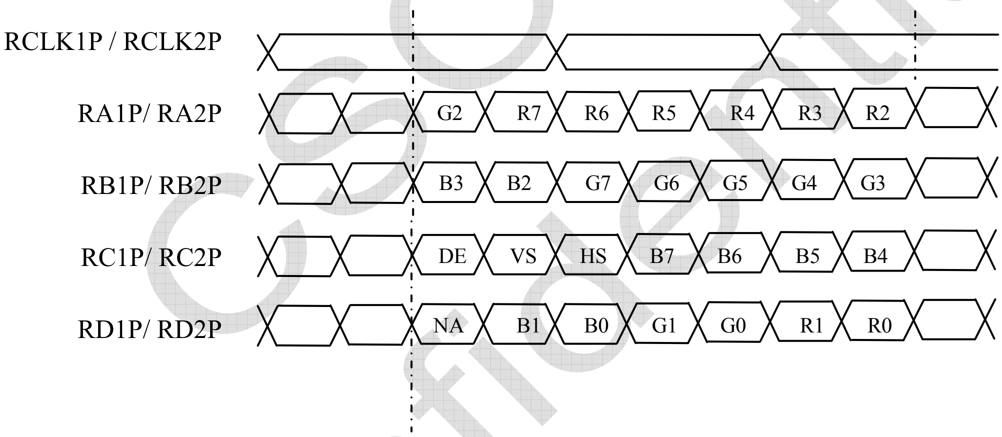


Fig. 4.3 JEIDA format

4.4 Pattern FOR Vcom Adjustment

Dot - inversion pattern

Frame N

+	-	+	-	+	-	+	-	+
-	+	-	+	-	+	-	+	-
+	-	+	-	+	-	+	-	+
-	+	-	+	-	+	-	+	-

Frame N+1

-	+	-	+	-	+	-	+	-
+	-	+	-	+	-	+	-	+
-	+	-	+	-	+	-	+	-
+	-	+	-	+	-	+	-	+

5. Interface Timing

5.1 Timing Table (DE Only Mode)

Signal		Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock		Frequency	F_{CLK} (=1/T_{CLK})	60	74.25	77	MHz	(2)
		Input cycle to cycle jitter	T_{rcl}	—	—	200	ps	(3)
		Spread spectrum modulation range	F_{clkin_mod}	F_{clkin}-2%	—	F_{clkin}+2%	MHz	(4)
		Spread spectrum modulation frequency	F_{SSM}			200	KHz	
LVDS Receiver Data		Receiver Skew Margin	T_{RSM}	-400	—	400	ps	(5)
Frame Rate		2D Mode	F	47	60	62	Hz	
		3D Mode	F	60	60	60	Hz	(7)
Vertical Term	2D	Total	TV	1115	1125	1380	TH	TV = TVD +TVB
		Display	TVD		1080		TH	
		Blank	TVB	35	45	300	TH	
	3D	Total	TV		1125		TH	(6) , (8)
		Display	TVD		1080		TH	
		Blank	TVB		45		TH	
Horizontal Term	2D	Total	TH	1050	1100	1150	TCLK	TH = THD + THB
		Display	THD		960		TCLK	
		Blank	THB	90	140	190	TCLK	
	3D	Total	TH	1050	1100	1150	TCLK	TH = THD + THB
		Display	THD		960		TCLK	
		Blank	THB	90	140	190	TCLK	

Notes:

(1)The module is operated in DE only mode, H sync and V sync input signal have no effect on normal operation.

(2) Please make sure the range of pixel clock follows the following equations:

$$Fclkin(max) \geq Fmax \times Tv \times Th$$

$$Fmin \times Tv \times Th \geq Fclkin(min)$$

T_V

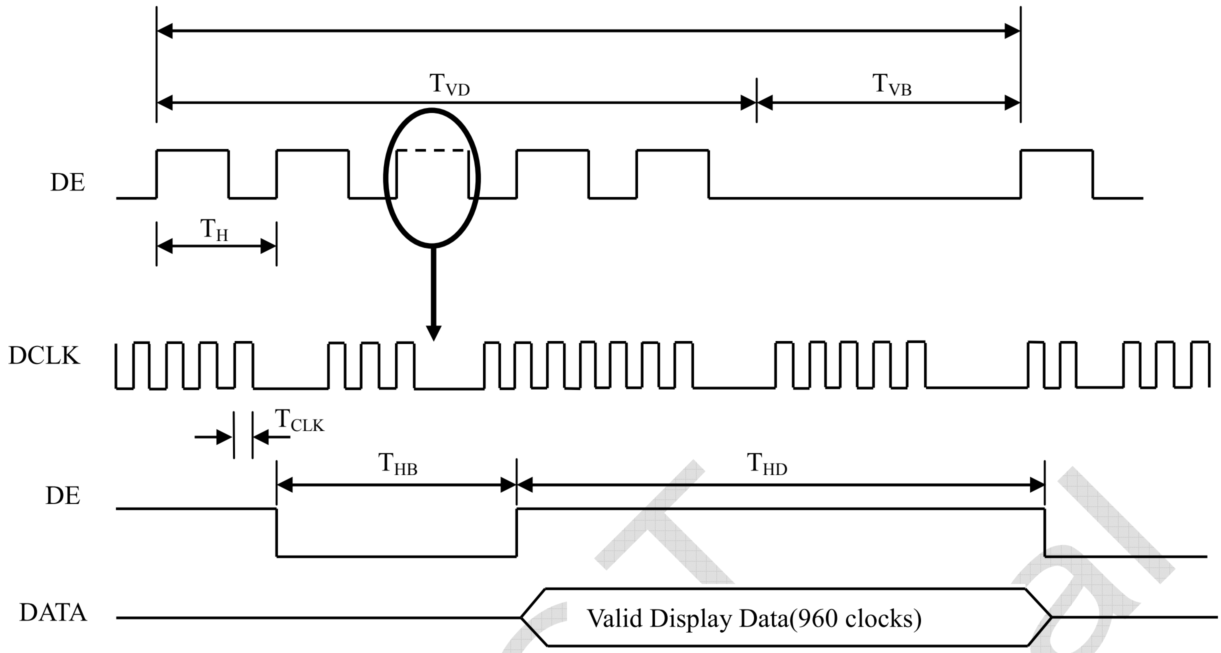


Fig. 5.1 Interface signal timing diagram

(3) The input clock cycle-to-cycle jitter is defined as the following figure. Trcl = I T1– TI

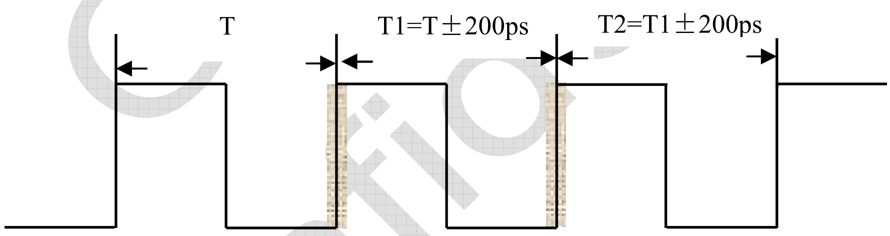
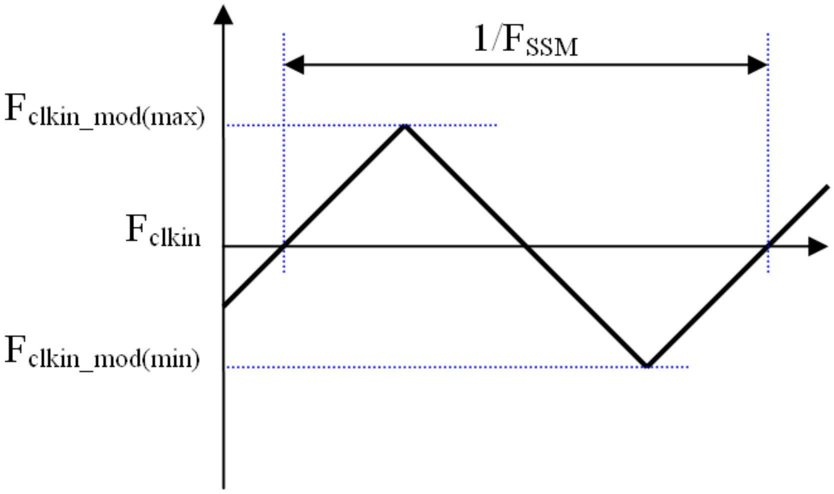


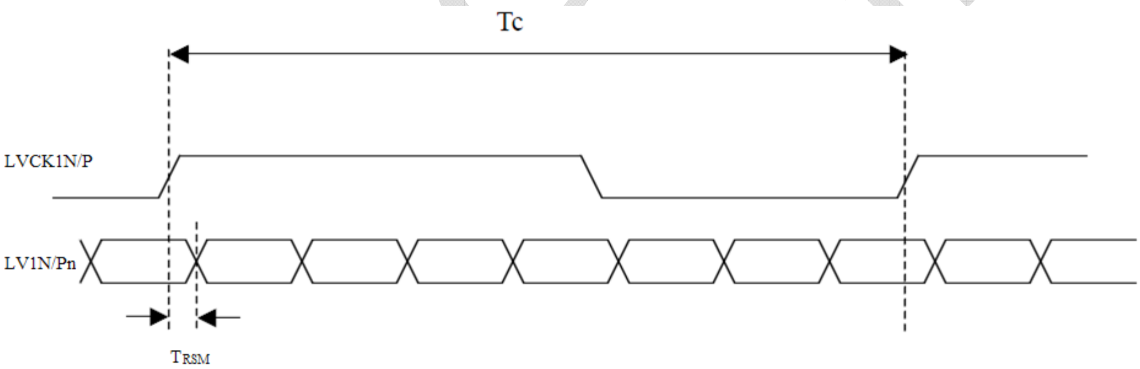
Fig. 5.2 jitter

(4) The SSCG (Spread Spectrum Clock Generator) is defined as the following figure.



(5) The LVDS timing diagram and setup/hold time is defined and showed as the following figure.

LVDS RECEIVERINTERFACE TIMING DIAGRAM



(6) Please fix the vertical timing in 3D mode.(Vertical Total =1125/Display=1080/Blank=45)

(7) In 3D mode, the setup F should be in Typ. In order to ensure that the eclectic function performance to avoid no display symptom.(Except picture quality symptom)

(8) In 3D mode, the setup Tv and Tvb should be in Typ. In order to ensure that the electric function performance to avoid no display symptom.(Except picture quality symptom)

6. Optical Characteristics

6.1 Measurement Conditions

The table below is the test condition of optical measurement.

Item	Symbol	Value	Unit
Ambient Temperature	T_A	25±2	ºC
Ambient Humidity	H_A	50±10	%RH
Supply Voltage	V_{CC}	12	V
Driving Signal	Refer to the typical value in Chapter 3: Electrical Specification		
Vertical Refresh Rate	F_R	120	Hz

To avoid abrupt temperature change during optical measurement, it's suggested to warm up the LCD module more than 60 minutes after lighting the backlight and in the windless environment.

To measure the LCD cell, it is suggested to set up the standard measurement system as Fig. 6.1. The measuring area S should contain at least 500 pixels of the LCD cell as illustrated in Fig.6.2(A means the area allocated to one pixel).In this model, for example, the minimum measuring distance Z is 370mm when θ is 2 degree. Hence, 500mm is the typical measuring distance. This measuring condition is referred to 301-2H of VESA FPDM 2.0 about viewing distance, angle, and angular field of view definition.

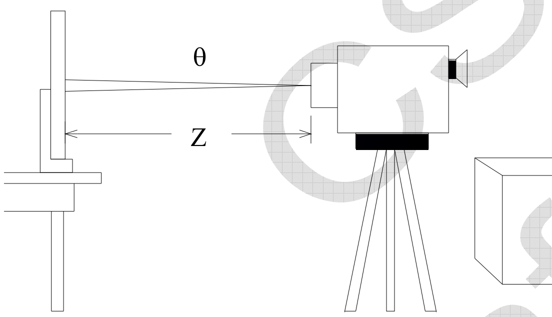


Fig. 6.1The standard set-up system of measurement

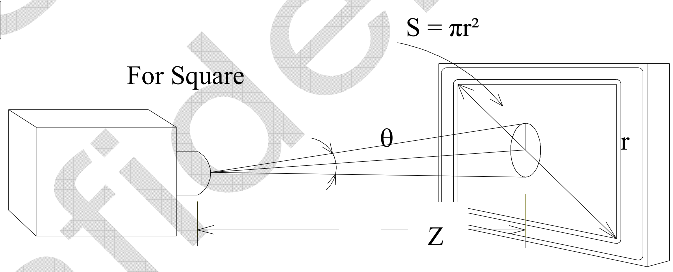


Fig. 6.2The area S contains at least 500 pixels to be measured

$$N = \frac{S}{A} \geqslant 500\text{pixels}$$

N means the actual number of the pixels in the area S.

6.2 Optical Specifications

The table below of optical characteristics is measured by MINOLTA CS2000,MINOLTA CA310, ELDIM OPTIScope-SA and ELDIM EZ Contrast in dark room.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Static Contrast Ratio		CR	θ_H=0°, θ_V=0° Normal direction at center point with CSOT's module: MT4761B01-1	-	4000	-	-	(1) (2)
Response Time		T_L		-	6.5	12	ms	(3)
Center Transmittance		T%		-	5.65		%	(2)(4)
Color Chromaticity (CIE1931)	Red	R_X		Typ. - 0.03	0.633	Typ. +0.03	-	(2) (5)
		R_Y			0.334		-	
	Green	G_X			0.322		-	
		G_Y			0.631		-	
	Blue	B_X			0.159		-	
		B_Y			0.049		-	
	White	W_X			0.280		-	
		W_Y			0.290		-	
	Color Gamut	CG		-	72	-	% NTSC	
Viewing Angle	Horizontal	θ_{H+}	CR≥10	-	89	-	Deg.	(6)
		θ_{H-}		-	89	-		
	Vertical	θ_{V+}		-	89	-		
		θ_{V-}		-	89	-		

Note:

(1)Definition of static contrast ratio (CR):

It's necessary to switch off all the dynamic and dimming function when measuring the static contrast ratio.

$$\text{Static Contrast Ratio (CR)} = \frac{\text{CR-W}}{\text{CR-D}}$$

CR-W is the luminance measured by LMD (light-measuring device) at the center point of the LCD module with full-screen displaying white. The standard setup of measurement is illustrated in Fig. 6.3; CR-D is the luminance measured by LMD at the center point of the LCD module with full-screen displaying black. The LMD in this item is CS2000.

(2)The LMD in the item could be a spectroradiometer such as (KONICA MINOLTA) CS2000, CS1000(TOPCON), SR-UL2 or the same level spectroradiometer. Other display color analyzer (KONICA MINOLTA) CA210, CA310 or (TOPCON) BM-7 could be involved after being calibrated with a spectroradiometer on each stage of a product.

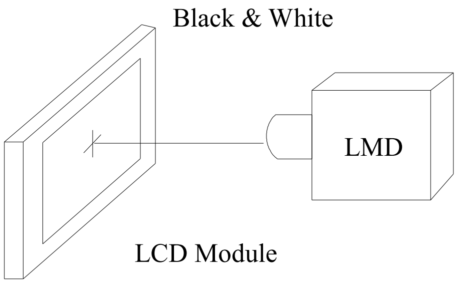


Fig. 6.3 The standard setup of CR measurement

(3) Response time T_L is defined as the average transition time in the response time matrix. The table below is the response time matrix in which each element $t_{X\ to\ Y}$ is the transition time from luminance ratio X to Y. X and Yare two different luminance ratiosamong0%,25%,50%,75%, and 100%luminance. The transition time $t_{X\ to\ Y}$ is defined as the time taken from 10% to 90% of the luminance difference between X and Y (X<Y) as illustrated in Fig.6.4. When X>Y, the definition of $t_{X\ to\ Y}$ is the time taken from 90% to 10% of the luminance difference between X and Y.The response time is optimized on refresh rate F_r =60Hz.

Measured Transition Time		Luminance Ratio of Previous Frame				
		0%	25%	50%	75%	100%
Luminance Ratio of Current Frame	0%		$t_{25\%\ to\ 0\%}$	$t_{50\%\ to\ 0\%}$	$t_{75\%\ to\ 0\%}$	$t_{100\%\ to\ 0\%}$
	25%	$t_{0\%\ to\ 25\%}$		$t_{50\%\ to\ 25\%}$	$t_{75\%\ to\ 25\%}$	$t_{100\%\ to\ 25\%}$
	50%	$t_{0\%\ to\ 50\%}$	$t_{25\%\ to\ 50\%}$		$t_{75\%\ to\ 50\%}$	$t_{100\%\ to\ 50\%}$
	75%	$t_{0\%\ to\ 75\%}$	$t_{25\%\ to\ 75\%}$	$t_{50\%\ to\ 75\%}$		$t_{100\%\ to\ 75\%}$
	100%	$t_{0\%\ to\ 100\%}$	$t_{25\%\ to\ 100\%}$	$t_{50\%\ to\ 100\%}$	$t_{75\%\ to\ 100\%}$	

$t_{X\ to\ Y}$ means the transition time from luminance ratio X to Y.

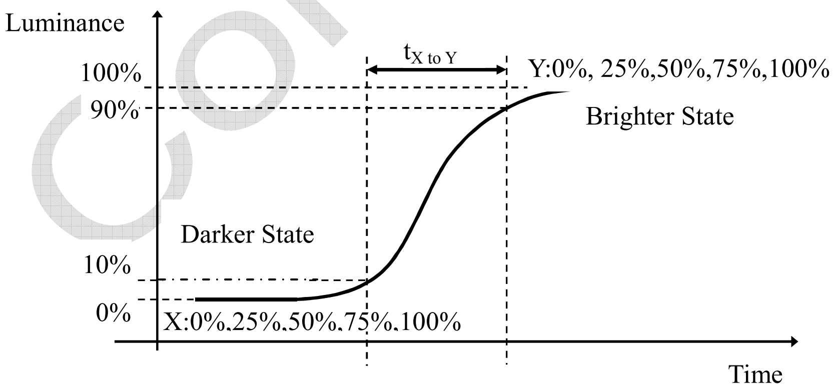


Fig. 6.4The definition of $t_{X\ to\ Y}$

All the transition time is measured at the center point of the LCD module by ELDIM OPTIScope-SA.

(4) Definition of center Transmittance (T%):

The transmittance is measured with full white pattern (Gray 255)

$$\text{Static Contrast Ratio (CR)} = \frac{\text{Luminance of LCD module}}{\text{Luminance of Backlight}}$$

(5) Definition of color chromaticity:

Each chromaticity coordinates (x, y) are measured in CIE1931 color space when full-screen displaying primary color R, G, B and white. The color gamut is defined as the fraction in percent of the area of the triangle bounded by R, G, B coordinates and the area is defined by NTSC 1953 color standard in the CIE color space. Chromaticity coordinates are measured by CS2000 and the standard setup of measurement is shown in Fig. 6.5.

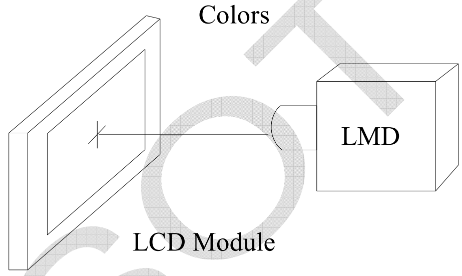


Fig. 6.5 The standard setup of color chromaticity measurement

(6)Definition of viewing angle coordinate system (θ_H,θ_V):

The contrast ratio is measured at the center point of the LCD module. The viewing angles are defined at the angle that the contrast ratio is larger than 10 at four directions relative to the perpendicular direction of the LCD module(two vertical angles :up θ_{V+} and downθ_{V-}; and two horizontal angles: right θ_{H+} and leftθ_{H-}) as illustrated in Fig. 6.6. The contrast ratio is measured by ELDIM EZContrast.

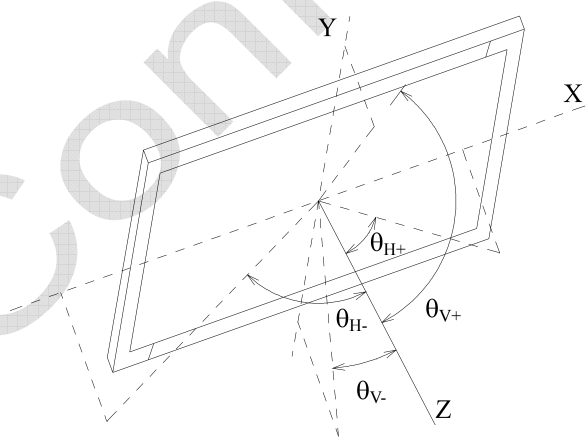
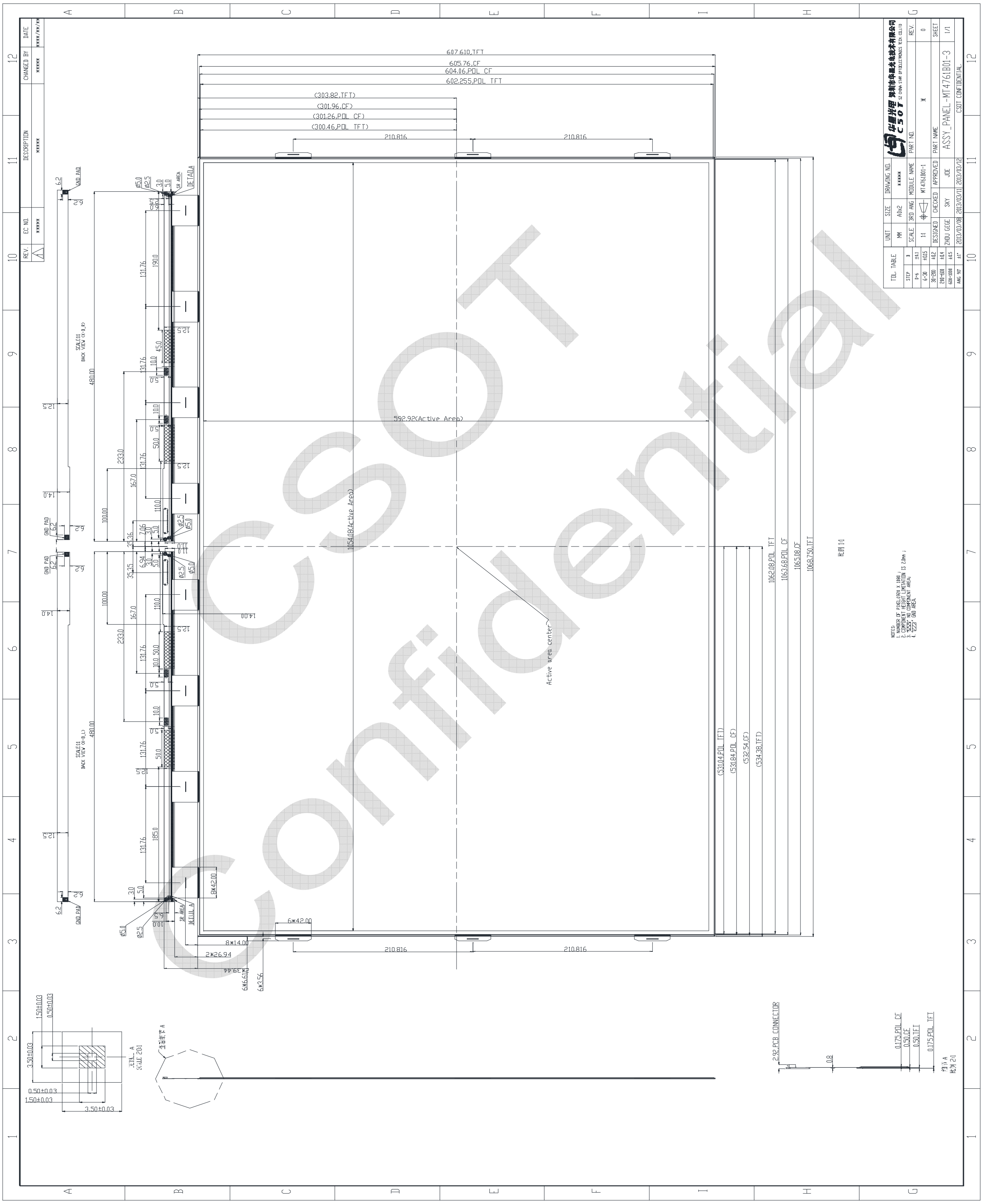


Fig. 6.6 Viewing angle coordination system

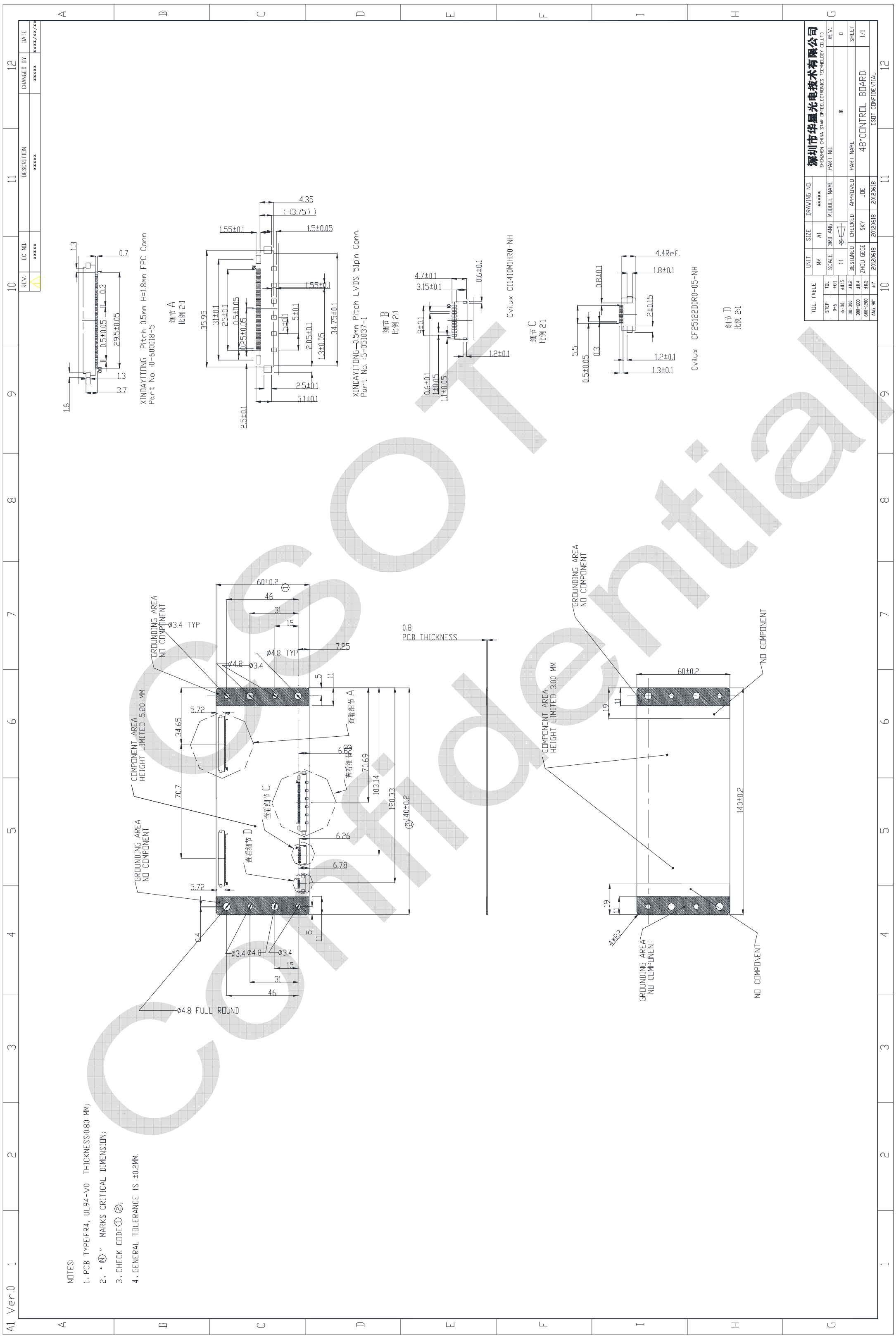
7. Mechanical Characteristics

7.1Mechanical Specification

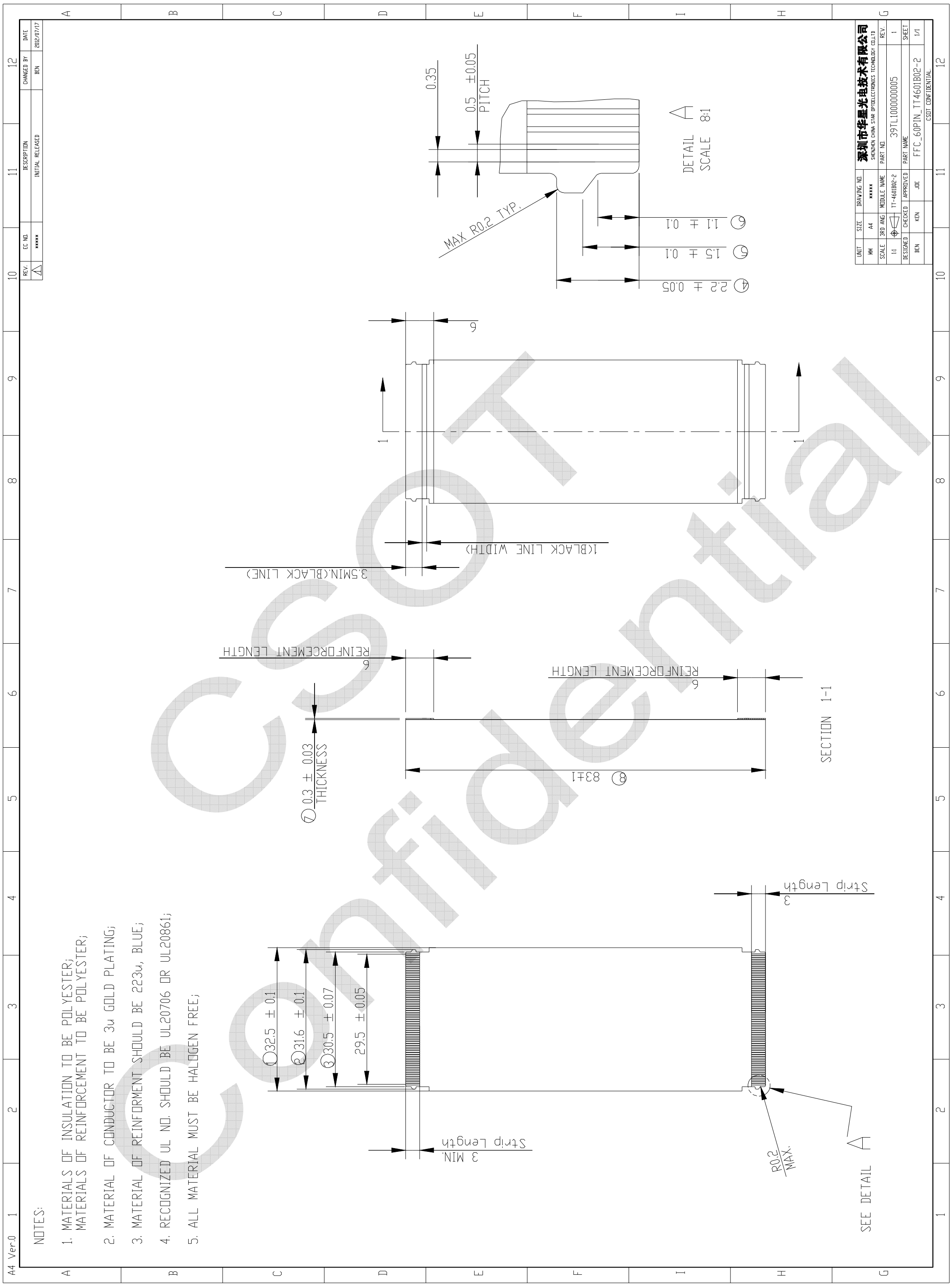
7.1.1 Open Cell Mechanical Specification



7.1.2 TCON Board Mechanical Specification



7.1.3 FFC Mechanical Specification

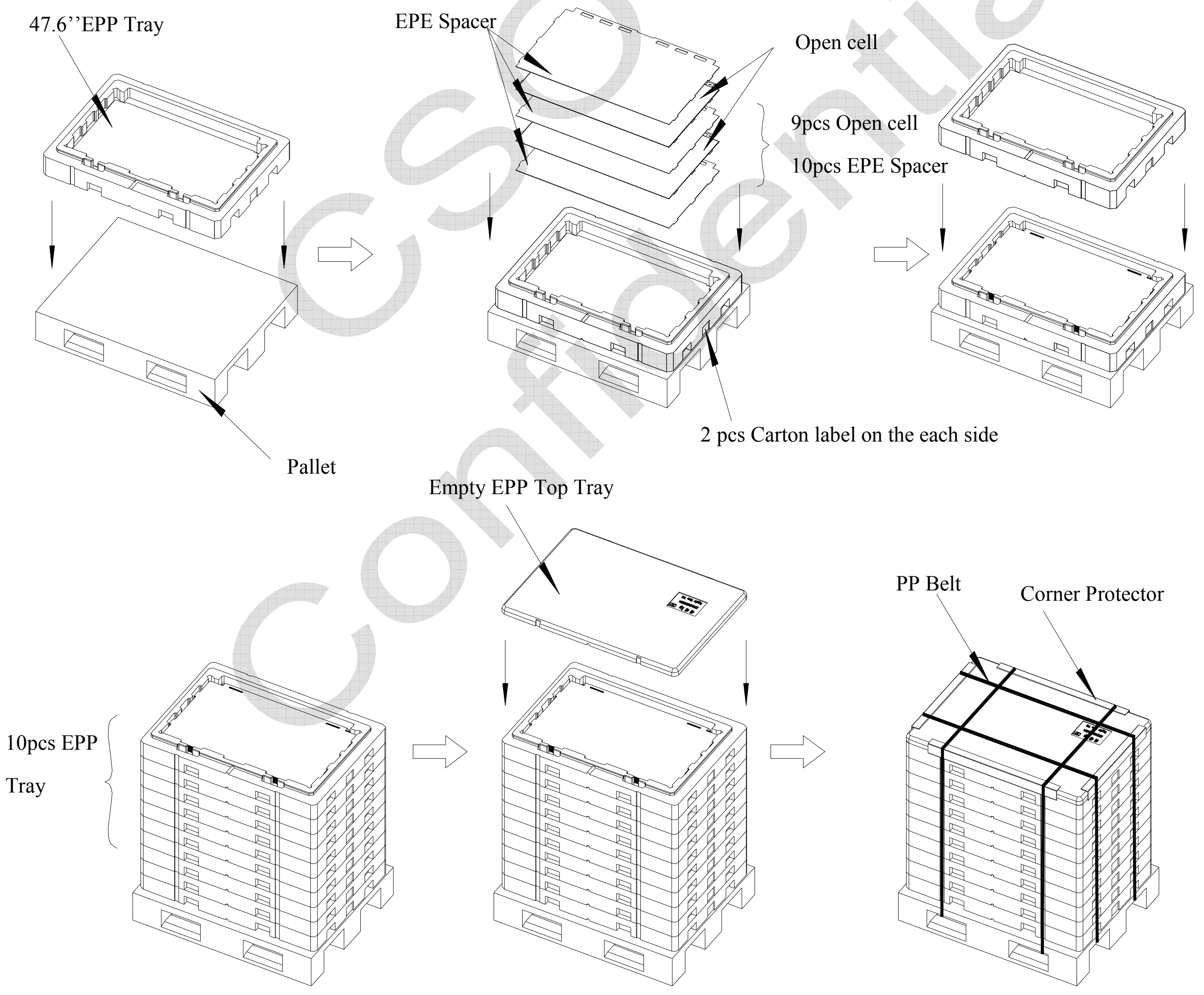


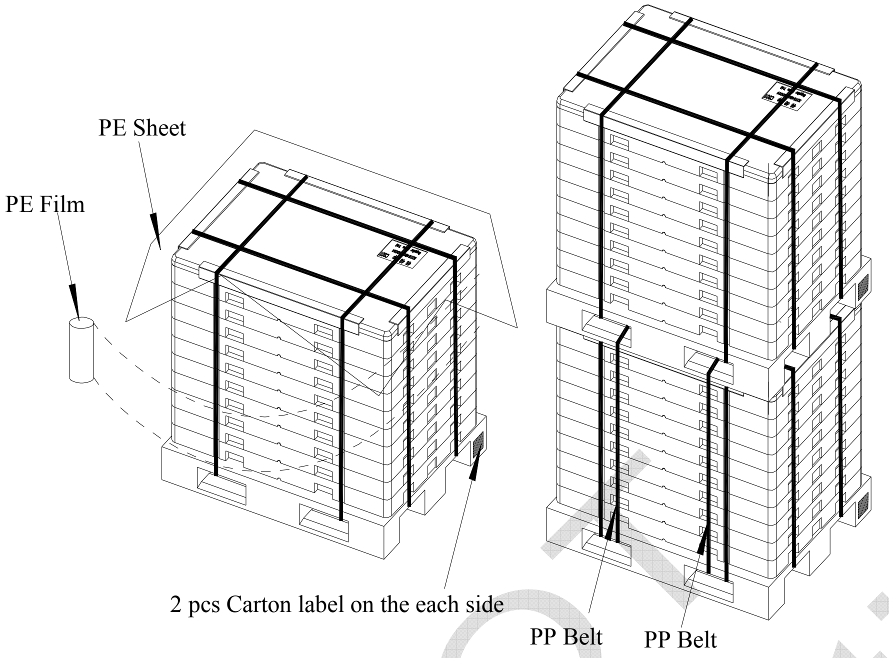
7.2 Packing

7.2.1 Packing Specifications

Item	Specification		
	Quantity	Dimension (mm)	Weight (kg)
Packing Box	9 pcs/box	1235(L) x 883 (W) x95 (H)	Net Weight: 18 (Max.) Gross Weight: 22(Max.)
Pallet	1	1250.00 (L) x 1000.00 (W) x 160.00 (H)	Net Weight:22
Stack Layer	10		
Boxes per Pallet	10boxes/pallet		
Pallet after Packing	90pcs/pallet	1250.0 (L) x 1000.0 (W) x 995.0 (H)	Gross Weight:244kg/pallet

7.2.2 Packing Method




PE Sheet
PE Film
2 pcs Carton label on the each side
PP Belt
PP Belt

8. Definition of Labels

8.1 Open Cell Label

XXXXXXXXXXXXXXXXXXXXXXXXST4761B01-3Ver. X.X

Model Version Code

Model Name

Week Code

Serial Number

Serial Number: XXXXXXXXXXXXXXXXXXXX

CSOT Internal Use

Panel ID

Week Code: XXXX

Week

Year

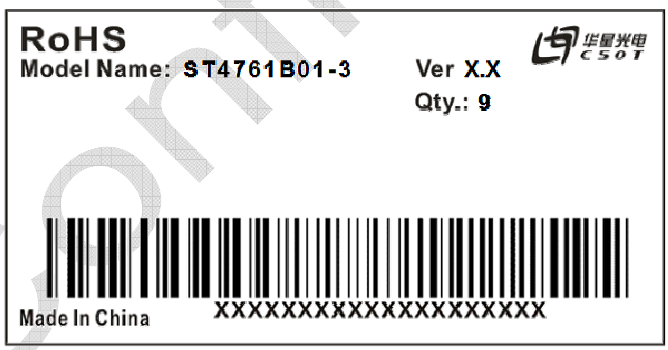
Year: 2010 =10, 2011 = 11 …2020= 20, 2021= 21…

Week: 01, 02, 03 …

Model Name: ST4761B01-3

Ver.X.X: Version, for example: 0.1, 0.2, … , 1.1, 1.2, …, 2.1, 2.2, …

8.2 Carton Label



Serial Number: XXXXXXXXXXXXXXXXXXXXX

CSOT Internal Use

Year, Month, Date

Model Version Code

CSOT Internal Use

8.3 Pallet Label

Model Name: ST4761B01-3

Serial Number: XXXXXXXXXXXXXX

- CSOT Internal Use
- Year, Month
- Model Version Code
- CSOT Internal Use

9. Precautions

9.1 Assembly and Handling Precautions

(1) Do not apply rough force such as bending or twisting to the open cell during assembly.

(2) It is recommended to assemble or install a open cell into the user's system in clean working areas. The dust and oil may cause electrical shorterdamage the polarizer.

(3) Do not apply pressure or impulse to the open cell to prevent the damage to the open cell.

(4) Always follow the correct power-on sequence. This can prevent the damage and latch-up to the LSI chips.

(5) Do not plug in or pull out the interface connector while the open cell is in operation.

(6) Use soft dry clothwithout chemicals for cleaning because the surface of polarizer's very soft and easily be scratched.

(7) Moisture can easily penetrate into the open cell and may cause the damage during operation.

(8) High temperature or humidity may deteriorate the performance of the open cell. Please store open cell in the specified storage conditions.

(9) When ambient temperature is lower than 10ºC, the display quality might be deteriorated. For example, the response time will become slow.

9.2 Safety Precautions

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the open cell end of life, it is not harmful in case of normal operation and storage.